Title: The Changing Face of America: Who Are We?

Brief Overview:

Using data from the U.S. Census Bureau and the Immigration and Naturalization Service (INS), the students will explore a variety of statistical concepts such as bar, line and circle graphs, scatter plots and linear relationships. Number operations and geometry skills are extended by having students interpret equivalent data as fractions, decimals, percents, and degrees. Students will be encouraged to make strong interdisciplinary connections with world geography and U.S. History. The final product will be communicated mathematically through a performance product and classroom debate.

NCTM 2000 Principles for School Mathematics:

- **Equity:** *Excellence in mathematics education requires equity - high expectations and strong support for all students.*

- **Curriculum:** *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*

- **Teaching:** *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*

- **Learning:** *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*

- **Assessment:** *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*

- **Technology:** *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

- **Content Standards**

  Number and Operations
  - The students will work with fractions, decimals, and percents to solve problems.
  - The students will strengthen their understanding that *percent* represents part of a whole.
  - The students will develop an understanding of large numbers.
  - The students will understand the meaning and effects of arithmetic operations with fractions, decimals and percents.
  - The students will select appropriate methods and tools for computing with fractions and decimals from among mental computations, calculators, and paper and pencil and apply the selected methods.

Algebra

- The students will explore relationships between symbolic expressions and graphs of lines, paying attention to the meaning of intercept and slope.
- The students will model and solve contextualized problems using various representations, such as graphs, tables, and equations.
- The students will use graphs to analyze the nature of changes in quantities in linear relationships.

Geometry

- The students will draw geometric objects (circle) with specified angle measures.

Measurement

- The students will use protractors to find angles of measure according to the data.

Data Analysis and Probability

- The students will create certain statistical graphs to demonstrate their ability to organize and display data. The students will discuss to demonstrate their understanding of the correspondence between data sets and their graphical representations.
- The students will use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken.
- The students will make predictions about possible relationships between two characteristics of a sample on the basis of scatter plots of the data and approximate lines of fit.

Process Standards

Problem Solving

- Students will be given a question and make predications using the knowledge of the graphs.

Reasoning and Proof

- The students will interpret the data and demonstrate the correlation of the graphs.

Communication

- The students will prepare and present a debate on immigration .

Connections

- The students will make connections between immigration and their lives, and how it affects them.

Representation

- The students will present their data and finding in circle graphs and scatter plots in an oral presentation.

Grade/Level:

Grades 7, 8, General Mathematics, Pre-Algebra, and Algebra.

Duration/Length:

5 days/45 minute periods.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Estimating and rounding
- Using protractors and compasses
- Working with fractions, decimals, and percentages
- Determining equivalent relations with fractions, decimals, and percentages
- Measuring angles
- Creating and analyzing basic graphs, for example, bar, line, circle, and scatter plots

Student Outcomes:

Students will:

- Construct and interpret bar graphs, circle graphs, and scatter plots.
- Graph a line in the coordinate system.
- Calculate the line of best fit and use it to interpret data and make predictions.
- Analyze data, draw a conclusion, and defend it.
- Prepare and present a debate argument using data and graphs.

Materials/Resources/Printed Materials:

- Protractors
- Compasses
- Graph paper
- Rulers
- Teacher's Protractor
- Teacher and student resource sheets (provided here)
- Graphing calculator (optional)

Development/Procedures:

Day 1
- Introduce the lesson with a discussion of the history of the Census (**Resource Information**). Discuss with students how the Census is conducted and why its creators felt it necessary to have a Census. Review relevant vocabulary and interesting facts about the most recent Census conducted in 2000.
- Have the students work in pairs to construct a *Web* that represents data graphically. The teacher will assess each group's prior knowledge about circle graphs, bar graphs, and scatterplots. The teacher will lead a discussion regarding why one form of representation is preferred over another depending on the data.
- Homework: Students discuss with their families about the census and ask if their parents participated and how they participated (i.e. survey form, telephone, interview, etc.).

Day 2
- Hand out **Activity I** and have the students' work individually to complete the table.
- Discuss the benefits of using a double bar graph. Ask students to submit examples where representing data using a double bar graph is more useful than using another form of representation (i.e. circle graph, scatterplot, etc.). Inform students that they will construct a double bar graph to compare the Census data collected in 1900 and 1990.
- Homework: Students will complete **Activity I**.

Day 3
- Review the double bar graphs constructed for homework. Distribute **Activity II** and inform students that they will construct a circle graph to represent the number of immigrants who reside in the fifty United States.
- Proceed through the activity using circle graph overhead and complete the table together. Students independently complete the circle graph using the data in the table. The teacher will monitor student progress.
- Distribute **Activity III** and instruct the students to read the page. Answer student questions and assign the remaining portion of the worksheet for homework.
- Homework: Students will complete **Activity III**.

Day 4
- Review homework from **Activity III**. Distribute **Activity IV** with the tables on Ireland, China and Mexico. Tell the students they will be looking at three specific countries using scatter plots and determine if there is a relationship among the countries.
- Tell the students they will create a scatter plot of the data on an *x* and *y* plane. The students will then look at the graph and decide where the line of best fit will be and sketch the line.
- Distribute **Activity IV Assessment Questions** and have the students answer the questions on the sheet.
- Homework: Students will complete **Activity IV Assessment Questions**.

Day 5
- Review homework **Activity Sheet IV**. Inform the students they will have a debate on some issues that affect the United States. The students will each have questions which they will need to answer (in opinion) and give mathematical proof to support their decision.
- At teacher discretion choose suggested questions given.

Performance Assessment:

Student progress will be assessed using a rubric for each day's activities. The students' abilities to construct and interpret a bar graph, circle graphs, and scatterplots will be assessed daily using the rubric included in the activity pages. In addition, the students' ability to debate a topic using graphic proof will be assessed using a rubric.

Extension/Follow Up:

A variety of extension activities are suggested:
a. Extend the students' understanding of the relationship between the table data, graph and equation of linear relationships to exponential relationships.
b. Compare and contrast the immigrant's experiences in 1900 versus current day.
c. Analyze immigration patterns and trends in the context of changing world geography, and political and economic conditions.
d. Create an individual family history tree (genealogy study).

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Resource Information

U.S. Census
Student Resource Information

<u>Making Sense of the Census</u>

Who?
In the year 2000, the government hired approximately 860,000 Census workers to count everyone in the United States. Over 280,000,000 Americans were counted.

What?
In 1787, the founding fathers made the census a law by making it part of the U.S. Constitution. The government must count every person in the country.

Where?
The counting for the Census begins in the tiny village of Unalakleet, Alaska and continues across the nation until everyone is counted.

When?
Every 10 years the government conducts the Census. Census forms are sent out in mid-March and are usually completed by November.

Why?
The Census determines how many lawmakers each state will have in the House of Representatives in Congress. The information is also used to decide where new schools, hospitals, housing and other services are needed. The Census gives us information about the growth of our country. The government is able to determine which states are gaining population due to birth, immigrants new to the U.S., and relocation.

How?
In mid-March, approximately 120 million Census forms were sent to Americans, 80 million forms were returned. Phone and in-person interviews were also conducted. Most people report only their name, age, gender and race. One in 6 families were asked to answer other questions. The Census 2000 cost the country $6.8 billion.

<u>Important Terms</u> (from *Merriam Webster's Collegiate Dictionary: Tenth Edition*)

Immigrate-   to enter a country of which one is not a native for permanent residence
Emigrate-   to leave one's country to live elsewhere
Migrate-   to move from one country or place to another
Race/Ethnicity- a group of people unified by a community of interests, habits, or
            characteristics; qualities of a large group classed according to common racial,
            national, tribal, religious, linguistic, or cultural background
Naturalized citizen- to be given the rights of a citizen, becoming established as if native to a
            country

Legal alien- a foreign-born resident who has not been naturalized and is still a citizen of a foreign country but is living in a country with permission from the government

Illegal alien- a foreign-born resident who has not been naturalized and is still a citizen of a foreign country but is living in a country without permission from the government

Green card- an identity card proving the permanent resident status of a legal alien in the U.S.

Refugee- a person who flees to a foreign country to escape danger or persecution

Interesting Facts About the 2000 Census
Information obtained from *Time for Kids.* *"The Changing Face of America."* March 15, 2001

- The Census results showed that the American melting pot is more mixed than ever, the number of ethnic and racial minorities is rising more quickly than the number of Caucasians. Minorities now make up about one-third or the nation's population.

- Hispanics have made the biggest gain. 35.3 million Americans are Hispanic. There are now as many Hispanics as there are African Americans.

- For the first time ever, the census allowed people to identify themselves as a member of more than one race. Nearly 7 million people identified themselves as multiracial, the number was the highest among those under the age of 18.

- 18 states will face congressional changes. Arizona, California, Colorado, Florida, Georgia, Nevada, North Carolina, and Texas gained seats in the U.S. House of Representatives. Connecticut, Illinois, Indiana, Michigan, Mississippi, New York, Ohio, Oklahoma, Pennsylvania, and Wisconsin lost seats.

- The top five fastest-growing states are Nevada, Arizona, Colorado, Utah, and Idaho.

- The U.S. has a population of more than a quarter billion people overall.

Activity I

Census Bar Graph

Directions: Use the following census information to create a double bar graph. First, complete the table by rounding each amount to the nearest ten thousand. Then, place the continents along the *x*-axis and determine an appropriate scale for the *y*-axis. Remember all of the necessary parts of a graph, neatness counts!

Number of Immigrants in the U.S. Grouped by Region of Birth

Region	Immigrants in 1900	Rounded to the nearest ten thousand	Immigrants in 1990	Rounded to the nearest ten thousand
Europe	8,881,548		4,350,403	
Asia	120,248		4,979,037	
Africa	2,538		363,819	
Oceania (incl. Australia)	8,820		104,145	
Latin America	137,458		8,407,837	
Northern America	1,179,922		753,917	
Other	10,742		808,158	

Source: U.S. Bureau of the Census, March 9, 1999
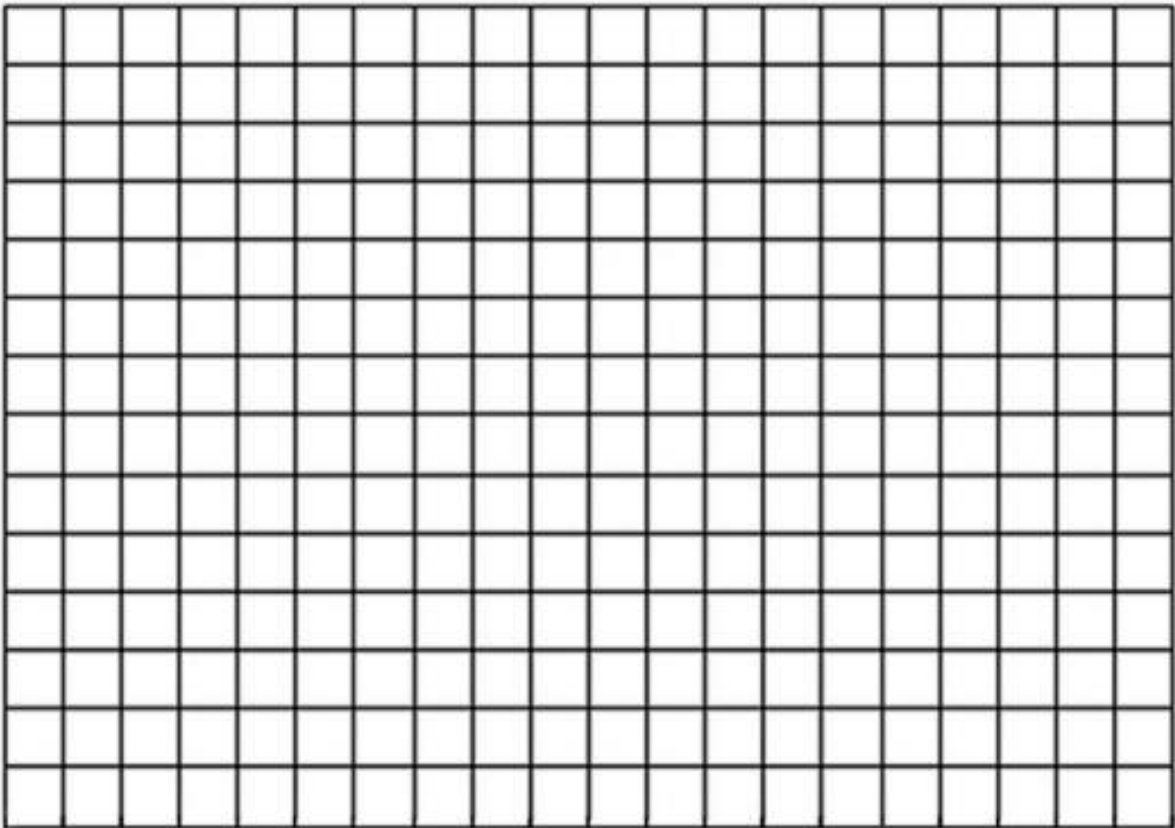
Activity I Assessment Questions   **Name** _____

Use the data and your graph to answer the following questions. Explain your answers using numerical proof.

1. What do you notice about the change in number of immigrants from:

    Europe?

    Asia?

    Latin America?

2. Select one of the regions from question number one. Using what you know about the history of these regions and why people immigrate, discuss why you think the immigration numbers changed so drastically.

3. Examine the data in the table. Is there another type of graph that would be appropriate to visually display the data? Explain.

4. Based on the data, what do you predict will happen to the number of immigrants from each region in the next 50 years. Record your predictions on the chart. Be prepared to discuss your answers and how you made your prediction.

Predicted Number of Immigrants

Region	Number of Immigrants
Europe	
Asia	
Africa	
Oceania (incl. Australia)	
Latin America	
Northern America	
Other	

Activity II
Using A Circle Graph
Top 5 States for Immigrants

According to the U.S. Census from the year 2000, there are 28.4 million immigrants living in this country. The majority of immigrants live in five states.

Directions: Together, we will construct a circle graph to show where most immigrants are living in the United States. Answer the questions and follow the procedures to complete the table provided before constructing your graph.

1. Look at the data.

State	Number of Immigrants
California	8.8 million
New York	3.6 million
Florida	2.8 million
Texas	2.4 million
New Jersey	1.2 million
Other 45 states	9.6 million

   When making a circle graph, you must decide if it is necessary to round the data. Here we are graphing very large numbers, the data has been rounded for you. To which place value are the data rounded? _____

2. What is the purpose for using a circle graph? _____

   To accomplish our purpose, it is necessary to convert our data into fraction form. For each state the numerator should be the state's number of immigrants and the denominator the total number of immigrants in the U.S.
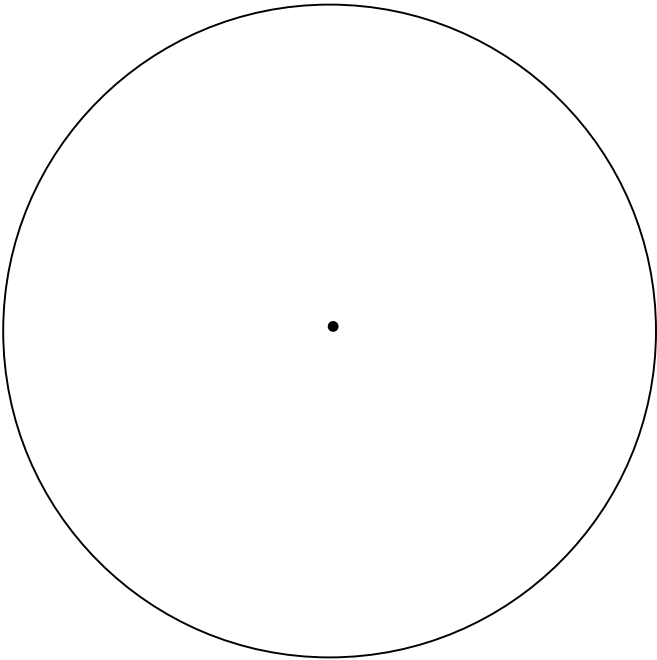
3. Convert each fraction to a decimal.

4. Convert each decimal to a percent.

5. Determine the number of degrees each section should occupy in the circle. To do this, you must know each section's percent of the whole.

   *   How many degrees are in a circle? _____
   *   The number of immigrants in California is what percent of the total number of immigrants? _____
   *   For the section labeled California in our graph, find how many degrees you must measure (percent of 360 degrees). _____
   *   Calculate the number of degrees for each state and record in the table.

6. Using a protractor, draw angles with the specified degree measures. Use the center of the

circle as the vertex.
7. Title your graph. Label each section with the state name and percent of immigrants.

Top 5 States for Immigrants

States	# of Immigrants (Rounded in millions)	Fraction target number / total	Decimal	Percent	Degrees (% of 360)

Activity III

On Your Own With Circle Graphs

Today, you will construct two circle graphs by analyzing the immigration data in Table 3, one circle graph for 1990 and another for 1900. Table 4 is provided to indicate the countries that are within each region. You will use a protractor, compass, and a ruler to construct your graphs. Label all sections of your graph with the proper titles and percentages.

Note: There are 360 degrees in a circle.

Table 3. Region of birth of foreign-born population

Region	1990	1900
Europe	4,350,403	8,881,548
Asia	4,979,037	120,248
Africa	363,819	2,538
Oceania	104,145	8,820
Latin America	8,407,837	137,458
Northern America	753,917	1,179,922
Other	808,158	10,742

Source: U.S. Bureau of the Census, March 9, 1999.
Internet source: http:/www.census.gov/population/www/documentation/twps0029/tab04.html

Table 4. Region / Countries

Region	Countries
Europe	England, Scotland, Wales, Great Britain n.e.c., Northern Ireland, Ireland, Denmark, Finland, Iceland, Norway, Sweden, Belgium, Luxembourg, Netherlands, Austria, France, Germany, Switzerland, Greece, Italy, Portugal, Spain, Albania, Bulgaria, Czechoslovakia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Soviet Union, Turkey in Europe, Yugoslavia, Other
Asia	Armenia, China, India, Japan, Palestine, Syria, Turkey in Asia, Other
Africa	Africa excl. Atlantic Islands, Atlantic Islands
Oceania	Australia, Other
Latin America	Cuba, Mexico, South America, Other
Northern America	Canada, Newfoundland, Other
Other	Countries not reported

Using Table 5 and Table 6 to record your results for 1990 and 1900 respectively, please perform the following calculations:

1. Calculate the fraction of the total number of immigrants from each region for 1990 and 1900. Show all of your calculations.
2. Calculate the percentages of the total number of immigrants from each region for 1990 and 1900. Show all of your calculations.
3. Find the measures of the angles of the immigrants by region by calculating the product of the percentage calculated by the total number of degrees in a circle. Show all of your calculations. Hint: Do not forget to change your percent to a decimal rounded to the nearest tenth.
4. Convert your percentages to degrees and then construct the angle.

Table 5: Immigration Population in 1990

Region	# of Immigrants (rounded in thousands)	Fraction Target number / total	Decimal	Percent	Degree (% of 360)
Europe					
Asia					
Africa					
Oceania					
Latin America					
Northern America					
Other					

Table 6: Immigration Population in 1900

Region	# of Immigrants (rounded in thousands)	Fraction Target number / total	Decimal	Percent	Degree (% of 360)
Europe					
Asia					
Africa					
Oceania					
Latin America					
Northern America					
Other					

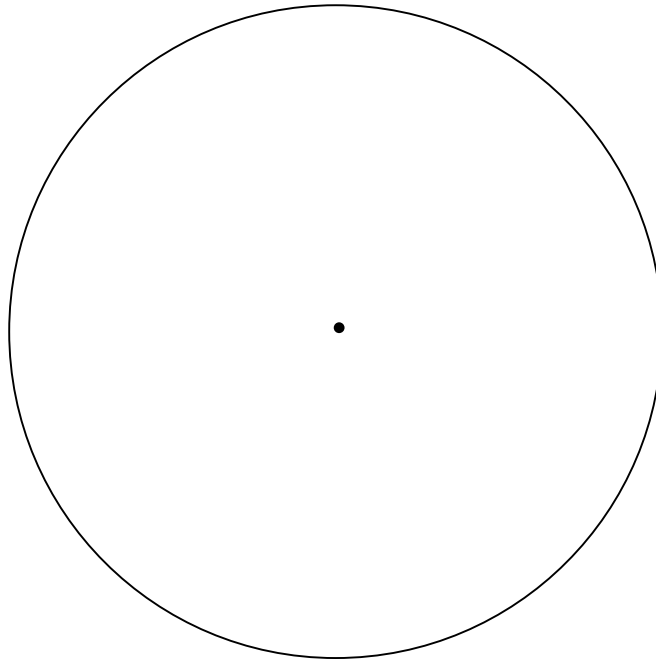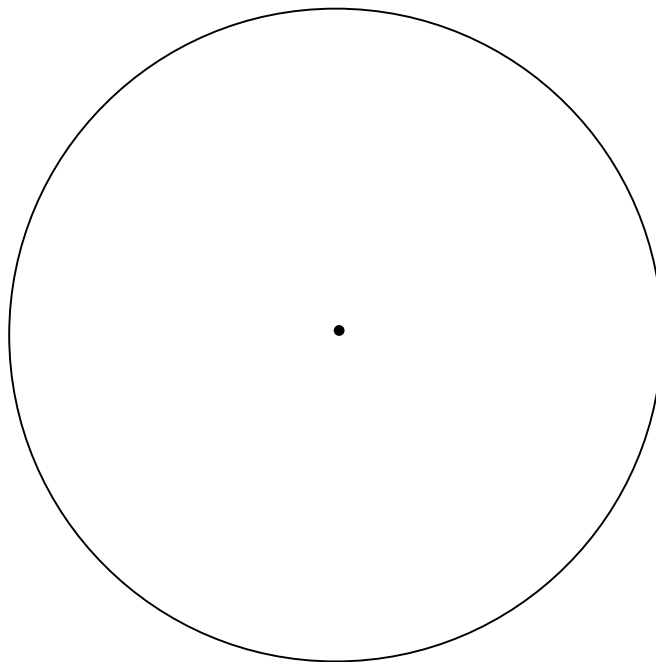**Table 5: Immigration Population in 1990**

Table 6: Immigration Population in 1900

Activity III Assessment Questions   **Name** _____

Directions: Use Table 5 and Table 6 to answer the following questions. Explain your answer.

1. Which region had the largest increase in immigration from 1900 to 1990?

_____

_____

_____

2. Which region had the largest decrease in immigration from 1900 to 1990?

_____

_____

_____

3. In relation to other regions, which region's immigration population remained relatively static from 1900 to 1990?

_____

_____

_____

4. According to Table 5 and Table 6, what do you predict the immigration populations from each region will look like in 2020? Support your argument mathematically.

_____

_____

_____

Activity IV

Immigration Trends of the Irish, Chinese and Mexicans

Teacher will inform that today the students will be looking at three specific countries - Ireland, China and Mexico. The students will use the data given and create a scatter plot of the data. The students will evaluate the graph and find the "line of best fit". For algebra students it will be the regression line.

The students will receive a table of data with immigration information from Ireland, China and Mexico. Using this data the students will create three separate scatter plots. Graphing calculators can be used in classes that have them. Students must use an appropriate scale and interval for their graphs.

The students will explore the data and find the line of best fit. For algebra students, this will be the regression line. The line of best fit will be the straight line that is the best average for the points. Working with a partner, the students are to sketch the line on the graph for all three countries.

Students will present a sample of the lines of best fit on transparencies and discuss and defend their illustration of best fit.

Students will take the three graphs and create a final graph that will have the three countries on the same graph. The students will have the appropriate scale for the *x*-axis and the *y*-axis. Note that the students will identify each graph with different symbols.

The students will complete their **Activity IV Assessment Questions** using their final graphs.

*For algebra students: The students will find the regression line using the calculator, find an equation for the line, and find the slope of the line.

Activity IV

Table: Country of Birth of Foreign-Born Population
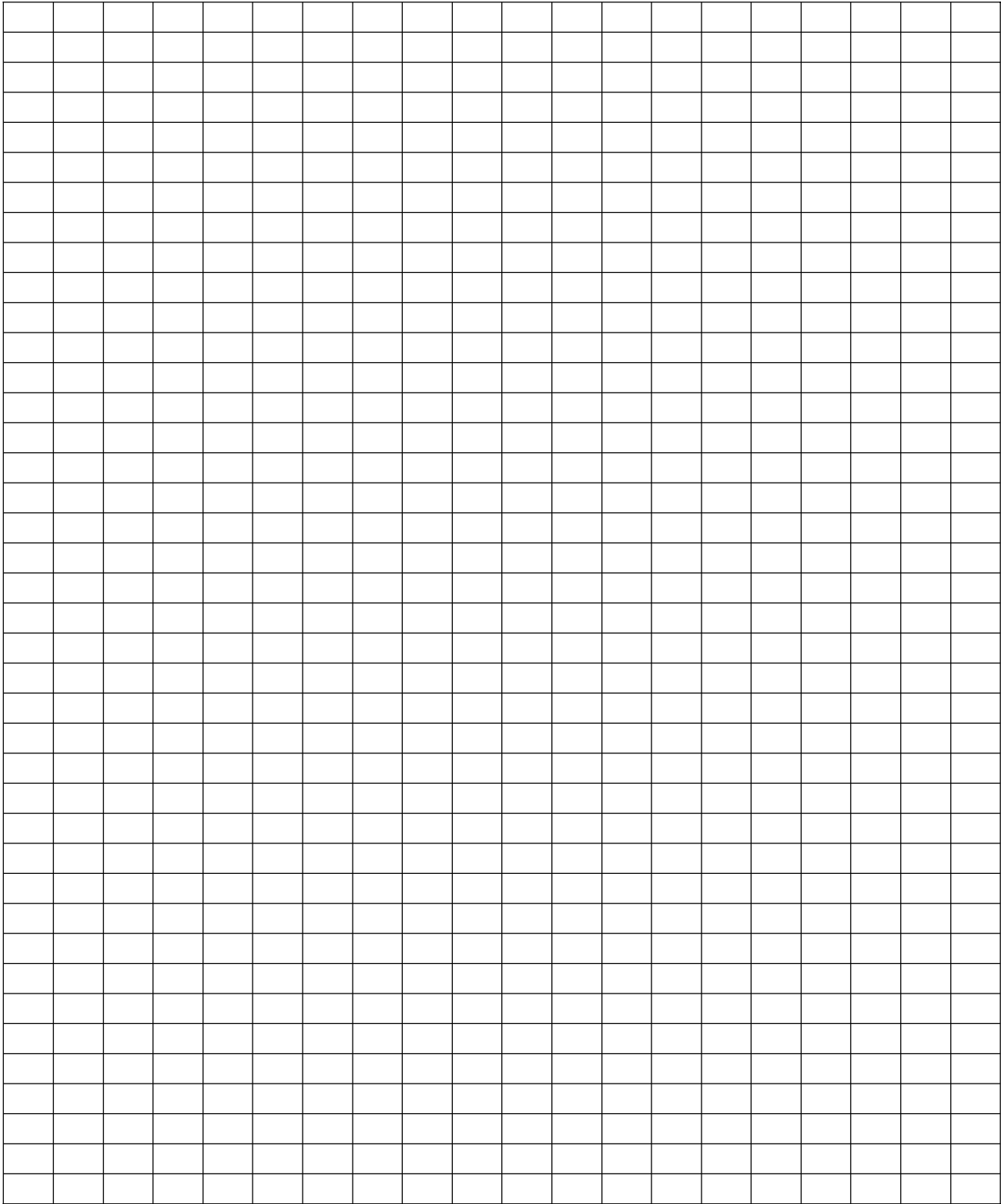(Detail shown in Decennial Census Publications of 1930 or Earlier; 1850 to 1930; and 1960 to 1990.)

Source : U.S. Bureau of the Census
Internet Release date: March 9, 1999

Census Year	Ireland	Ireland In 000s	China	China In 000s	Mexico	Mexico In 000s
1860	1,611,304		35,565		27,466	
1870	1,855,827		63,042		42,435	
1880	1,854,571		104,468		68,399	
1890	1,871,509		106,688		77,853	
1900	1,615,459		81,534		103,393	
1910	1,352,251		56,756		221,915	
1920	1,037,234		43,560		486,418	
1930	744,810		46,129		641,462	
1960	338,722		99,735		575,902	
1970	251,375		172,132		759,711	
1980	197,817		286,120		2,199,221	
1990	169,827		526,837		4,298,014	

The COUNTRY header spans the Ireland, Ireland In 000s, China, China In 000s, Mexico, and Mexico In 000s columns.

Activity IV Scatter plot   **Name** _____

Activity IV Assessment Questions   **Name** _____

1. What type of correlation is represented by each country's graph? Explain your answer using math vocabulary.

    Ireland -

    China -

    Mexico -

2. Do the three individual country graphs reflect what you observed with the continent immigration patterns?

3. Can you make a conjecture that explains why there is no census data from 1940 and 1950?

4. What does the graph of the line tell you about the immigration trends of the:
        Irish -

        Chinese -

        Mexicans -

5. Using your graphs, make a prediction what the census data will reveal for immigration data in 2000. Make a prediction for immigration in 2025 and 2050.

                    2000   2025   2050

    Ireland -

    China -

    Mexico -

        Are your predictions reasonable? Explain why.

Closing Activity: Classroom Debate

At the teacher's discretion, a classroom debate is suggested as the closing activity. All students are expected to be engaged and prepared to participate and contribute. The following suggestions are provided as a means to frame the debate questions, research and mathematical support of opinions.

1. Given your knowledge and understanding of immigration trends and the uses of U.S. Census data, do you think it is a good idea for our government to try to control population by setting quotas (limits) on the number of immigrants to our country?

2. After the terrorist attacks of September 11, 2001, many Americans feel strongly that we should restrict entry into our country. This includes limits on students, tourists, and refugees as well as immigrants. Using your graphing skills and understanding of the data, do you support:

    a. Closing our borders on a permanent basis?
    b. Closing our borders on a temporary basis?
    c. Keeping our borders open but set limits (quotas) on who gets in?
    d. Keeping our borders open to all legal immigrants – the status quo?

Using mathematical language, support your opinions for and against each of these positions.

Rubric A – "Activities I – IV"

Level 3

All calculations are correct. Students can communicate mathematical ideas, processes and concepts. All regions labeled with the correct percentages and title on the graph. The explanation and/or justification are logically sound, clearly presented, fully developed, and supported by the data. The presentation demonstrates a complete understanding and analysis of the problem.

Level 2

Minimal computational errors. Students show some ability to communicate mathematical ideas, processes, and concepts. The explanation and/or presentation support the solution and are plausible, although it may not be well developed or complete. The presentation demonstrates a conceptual understanding and analysis of the problem.

Level 1

Major computational errors, but effort was demonstrated. Students show little ability to communicate ideas, processes, and concepts. The explanation and/or justification may be incomplete. The presentation demonstrates a minimal understanding and analysis of the problem.

Level 0

Student did none of the calculations or showed any communication of ideas, processes, and concepts.